Rules and Regulations
K.S.A. 82a-301 to 305a
Division of Water Resources
Kansas Department of Agriculture
Effective September 22, 2000

K.A.R. 5-40-1. Definitions. As used in K.S.A. 82a-301 through 82a-305a and amendments thereto, in the regulations adopted pursuant thereto, and by the division of water resources in administering K.S.A. 82a-301 through 82a-305a and amendments thereto, unless the context clearly requires otherwise, the following words and phrases shall have the meaning ascribed to them in this regulation: (a) "Application" means the formal document submitted to the chief engineer requesting a permit, in accordance with the provisions of K.S.A. 82a-301 through 82a-305a and amendments thereto, that authorizes the applicant to proceed with the construction of a proposed dam, channel change, or stream obstruction.

(b) "Authorized representative" means any staff employee designated by the chief engineer to perform duties and functions on behalf of the chief engineer.

(c) "Channel change or stream obstruction" means any project or structure, including any dam, that meets either of the following criteria:

(1) Does not extend above the higher natural bank; or

(2) alters the course, current, or cross section of any stream of the state.

(d) "Chief engineer" means the chief engineer, division of water resources of the Kansas department of agriculture.

(e) "Dam" means any artificial barrier, together with appurtenant works, that does, or may, impound water.

(f) "Freeboard" means the vertical distance between the maximum stage attained in the design storm event and the top of the structure.

(g) "Navigable stream" means the Arkansas river, the Missouri river, and the Kansas river.

(h) "Perennial stream" means a stream, or part of a stream, that flows continuously during all of the calendar year, except during an extreme drought.

(i) "Permit" means the formal document that is issued by the chief engineer to the sponsor of a project and that authorizes the sponsor to proceed with the construction of the dam, channel change, or stream obstruction.

(j) "Reservoir" means the area upstream from a dam that contains, or will contain, impounded water.

(k) “Stream” means any watercourse that has a well-defined bed and banks, and that has a watershed above the geographic point in question that exceeds the following number of acres:

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(1) Zone three: 640 acres for all geographic points within any county west of a line formed by the adjoining eastern boundaries of Phillips, Rooks, Ellis, Rush, Pawnee, Edwards, Kiowa, and Comanche counties;

(2) zone two: 320 acres for all geographic points within any county located east of zone three and west of a line formed by the adjoining eastern boundaries of Republic, Cloud, Ottawa, Saline, McPherson, Reno, Kingman, and Harper counties; and

(3) zone one: 240 acres for all geographic points within any county located east of zone two. The stream need not flow continuously and may flow only briefly after a rain in the watershed. If the site of the project has been altered so that a determination of whether the well-defined bed and banks exist is not possible, it shall be presumed that they did exist if the watershed acreage criteria have been met, unless the owner of the project can conclusively demonstrate that the well-defined bed and banks did not exist before the construction of the project.

(l) "Watershed" means all of the area draining toward a selected point on a stream. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1987; amended, T-5-12-30-91, Dec. 30, 1991; amended Feb. 17, 1992; amended Sept. 22, 2000.)

5-40-2. Dams; plans and specifications. Plans for dams shall include: (a) Plan view of dam and dam site. The plan view of the dam and dam site may be shown in connection with the topographic map of the reservoir basin, providing the scale is sufficiently large to show adequate detail. A separate plan view shall be used if necessary to clearly show the features of the entire area in which the dam and spillway are to be located, and the details required below. The area covered by this view shall be on both abutments of the dam as well as a considerable distance both upstream and downstream from the dam. All elevations shown on plans shall be referred to permanent bench marks described on the plans. The following details shall be shown:

(1) Location of the axis of the dam, showing stationing and top width limits;
(2) toe of upstream and downstream slopes;
(3) location of center line and limits of emergency spillway;
(4) location of principal spillway and any stilling basin;
(5) location of berms;
(6) location of slope protection;
(7) location of borings or test holes and test pits;
(8) location of intakes, outlets, valves and valve wells;
(9) location, description and elevation of permanent bench marks; and
(10) location, description and details of all foundation drains;

(b) Map of drainage pattern above and below the dam site. A map, to a scale no smaller than one inch to 2,000 feet, shall show the location of the watercourse across which the dam is to be built and its tributaries above the dam site. The following shall also be shown:

(1) The location of the dam and the outline of the reservoir;
(2) the boundary of the watershed, shown by a line enclosing the entire area that will drain into the reservoir;
(3) section lines, with sections properly identified;
(4) the size of the drainage area;
(5) the land owned by the sponsor; and

(6) roads, railroads, pipeline crossings and any other prominent features in the vicinity. The point where the axis of the dam crosses the stream shall be shown on this map by showing distances and angles from an apparent section corner or quarter corner. It shall be acceptable to utilize an aerial photograph to make this determination;

(c) Topographic map of the reservoir basin. A topographic map of the dam site and reservoir area shall be shown to the following scale:

Surface areas at top of dam	Acceptable scale
less than 30 acres	one inch to 100 feet
30 acres through 100 acres	one inch to 200 feet
more than 100 acres	one inch to 300 feet

The location of the dam shall be superimposed on this map. Topography shall be shown by contours at two foot intervals. For dams more than 20 feet in height, contours may be spaced at greater intervals, but shall not exceed five feet. In addition, contours equivalent to the elevation of the lowest uncontrolled opening (permanent pool), elevation of the crest of the emergency spillway, and elevation of the top of the dam shall be shown. The elevation of each contour shall be clearly noted on the map;

(d) Cross section of dam site and longitudinal section of dam. The cross section of the valley at the dam site shall be taken along the axis of the dam. A separate cross section view shall be used if necessary to clearly show the details required below. The details on this section shall include the following:

(1) Elevation to which the top of the dam is to be maintained and the elevation to which it is to be initially constructed in order to provide an adequate settlement allowance;
(2) elevation of the stream bed;
(3) location and elevation of the crest of the emergency spillway;
(4) location and elevation of the crest of the principal spillway;
(5) elevation of any berms;
(6) original surface of the ground;
(7) proposed elevations and dimensions of cutoff trench;
(8) location and elevation of outlet works;
(9) location of test holes showing materials encountered in the section; and
(10) location, description and elevations of all foundation drains;

(e) Cross section of dam. A cross section of the dam at the deepest point shall be shown. If the cross section is variable, a typical section shall be shown for each reach with proper description of the reach by stationing. Additional cross sections along the axis of the principal spillway and the axis of any other outlets shall be shown. Cross sections of the dam shall include the following:

(1) Elevation and width of the top of the dam;
(2) elevation and width of any berms;
(3) slopes of upstream and downstream faces of the dam;
(4) elevation, location and type of slope protection;
(5) zones of earth embankment;

(6) dimensions to which the dam is to be constructed to provide an adequate allowance for settlement;
(7) elevation, location and dimensions of cutoff trench and core wall; and
(8) location of all foundation drains;

(f) Plan, profile, and cross section of emergency spillway. Details of the emergency spillway shall include the following:

(1) Plan view showing the location and stationing along the center line of the emergency spillway, together with the location of the control section and details of riprap or other slope and floor protection;
(2) sections showing elevations, slopes and dimensions of the spillway; and
(3) profile along the axis of the spillway, extending from the reservoir area through the control section to the stream bed below the dam. Stationing on the profile shall correspond to that on the plan view. This profile shall show the existing ground elevation, proposed grade of the bottom of the spillway, elevation of slope protection on the side slopes, and the nature of the material through which the spillway is excavated;

(g) Profile of principal spillway. Details of the principal spillway shall include the profile along the axis of the spillway, extending from the intake to the outlet, showing the size and spacing of the cutoff collars. This profile shall show existing ground elevations and the proposed grade of the spillway. Details of the stilling basin, supports and other features shall also be shown;

(h) Reservoir data. The number of acres enclosed by each contour within the reservoir basin and the total storage capacity of the reservoir in acre-feet at the elevation of each contour shall be determined and tabulated on the plan. The data shall be compiled for all contours in the reservoir up to the elevation of the top of the dam. Computations of capacity shall be based on the natural topography of the reservoir basin including the volume of any excavation in the reservoir below the emergency spillway made during construction of the dam. When the reservoir is divided between more than one landowner, the property lines shall be shown on the topographic map of the basin;

(i) Bench marks. At least two permanent bench marks shall be set for future reference conveniently located for use after construction. The bench marks shall be placed where they will not be destroyed or submerged after the reservoir fills, preferably, at a location along the axis of the dam near both dam extremities. A three or four foot length of pipe or steel driven flush with the ground in an area which is unlikely to be disturbed may be used. Wood or plastic stakes, nails, or marks in trees shall not be considered as permanent bench marks. The location and description of the bench marks shall be shown on the plans. They shall be properly referenced so that they can be easily found in the field. Elevations for size two, size three and size four structures shall be referenced to the national geodetic vertical datum of 1929 to a tolerance of plus or minus one half foot. Elevations for size one structures shall be referred to any assumed datum; and

(j) Spillway discharge capacity data. (1) A curve or table showing discharge capacity of the emergency spillway, in cubic feet per second, shall be developed and shown on the plan.

(2) A curve or table showing discharge capacity of the principal spillway, in cubic feet per second, shall be developed and shown on the plan.

(k) Each application for a permit to construct a class (c) high hazard dam shall include an emergency preparedness plan. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1985; amended May 1, 1987.)

5-40-3. Specifications. The specifications for dams, channel changes and obstructions shall be prepared on 8 1/2 by 11 inch sheets of a good grade of white bond paper. The specifications shall be in sufficient detail to assure that the works will be properly executed and shall comply with currently accepted engineering practices. The specifications shall include provisions for: (a) Adequate supervision during the period of construction by a person qualified to design the structure;

(b) notification of the division of water resources of the status of construction; and

(c) inspection by representatives of the division of water resources. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1987.)

K.A.R. 5-40-4. Preparer of maps, plans, profiles, and specifications. In addition to the requirements of the Kansas board of technical professions, the requirements in this regulation shall apply. (a) Each map, plan, profile, and specification submitted to the chief engineer for approval shall be prepared by a person who is competent in the design and construction of dams, channel changes, or stream obstructions, as appropriate.

(b) Maps, plans, profiles, and specifications for any dam that meets one of the following criteria shall be prepared by a licensed professional engineer who is competent in the design and construction of dams:

(1) Impounds 50 acre-feet or more at the top of the dam;
(2) is 25 feet or more in height; or
(3) is either a class (b) or class (c) hazard dam.

(c) Maps, plans, profiles, and specifications for any channel change or stream obstruction project on a navigable stream or a stream having a mean annual flow of 100 cubic feet per second or more at the proposed location of the project shall be prepared by a licensed professional engineer who is competent in the design of that type of project.

(d) No provision of this regulation, nor any decision made by the chief engineer pursuant to this regulation, shall alter the responsibilities or duties of any licensee of the Kansas board of technical professions to comply with that board's requirements. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1986; amended May 1, 1987; amended Sept. 22, 2000.)

5-40-5. Determining capacity of reservoir. To determine whether a dam impounds 30 acre-feet of water, pursuant to K.S.A. 82a-304, that measurement shall be made at the lowest elevation of the top of the dam. (Authorized by K.S.A. 1981 Supp. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983.)

5-40-6. Waiver and stricter requirements. (a) The chief engineer may waive any of the regulations adopted under articles 40, 41, 42 and 43 if it is shown to the satisfaction of the chief engineer that the waiver of the regulation will not pose a hazard to the public safety and that the waiver is in the public interest.

(b) The chief engineer may also invoke any jurisdiction granted by statute and impose stricter requirements than required by rules and regulations where such jurisdiction or additional requirements are necessary to protect the public interest, protect the public safety or prevent damage to property. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1983; amended May 1, 1987.)

5-40-7. Other maps, plans, profiles, data and specifications. The applicant shall also submit any other maps, plans, profiles and specifications of the dam, channel change or obstruction and any other data which the chief engineer may require. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1987.)

5-40-8. Application. The application shall be filed on the prescribed form or forms furnished by the chief engineer and shall be completed in proper form. (Authorized by K.S.A. 1981 Supp. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983.)

5-40-9. Adoption by reference. All of "engineering guide-1" (eg-1), relating to earth dams, hazard classes, spillway requirements, detention storage requirements and rainfall data, as revised May 1, 1986, by the Kansas state board of agriculture, division of water resources, is hereby adopted by reference and shall apply to dams constructed in this state. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1983; amended May 1, 1985; amended May 1, 1986.)

5-40-10. Adoption by reference. All of "engineering guide-2" (eg-2), relating to administrative requirements and criteria for the design of earth dams, as revised May 1, 1986, by the Kansas state board of agriculture, division of water resources, is hereby adopted by reference and shall apply to dams constructed or modified in this state. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1984; amended May 1, 1985; amended May 1, 1986.)

K.A.R. 5-40-11. Alternative requirements for approval to construct a dam. Construction or modification of a dam shall be approved by the chief engineer with any permit conditions necessary to protect life, property, and public safety if both of the following conditions are met:

(a) The applicant applies for prior written consent or a permit to build or modify a dam.

(b) The proposed dam or modification of a dam does not meet one or more of the hydrologic and engineering requirements of K.A.R. 5-40-9 and K.A.R. 5-40-10, but the applicant demonstrates to the chief engineer, based on sound hydrologic and engineering principles, that the proposed dam, or modification of a dam, will not endanger life, property, and public safety if it is constructed or modified in accordance with the submitted plans and specifications. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302 and 82a-303; effective Sept. 22, 2000.)

5-40-12. As built drawings. Following completion of all class (c) high hazard dams, within 90 days, or within any authorized extension of time, the applicant shall submit as built drawings prepared by a person authorized to prepare the original plans and specifications pursuant to K.A.R. 5-40-4. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-40-13. Safety inspections. Following the completion of construction of any class (c) high hazard dam, the owner shall have a dam safety inspection conducted by a licensed professional engineer and have the report submitted to the division of water resources. Inspections shall be conducted at five year intervals,

or more frequently if specifically requested by the chief engineer. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

K.A.R. 5-40-14. Testing a principal spillway pipe installation in a dam; applicability. (a) For the purpose of testing the leakage rate of principal spillway pipe installation in a dam, an applicant shall conduct a static pressure test of each principal spillway installation constructed of corrugated metal pipe.

(b) A static pressure test shall be required only of a principal spillway installation made of corrugated metal pipe, unless the chief engineer determines that testing principal spillway pipe made of other materials or testing other pipes used in the construction of dams is necessary to protect public safety, life, or property. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303b; effective Sept. 22, 2000.)

K.A.R. 5-40-15. Testing a principal spillway pipe installation in a dam; general procedures. The following general procedures shall apply to all static pressure tests required by K.A.R. 5-40-14: (a) The applicant shall conduct the test before backfilling around and over the principal spillway pipe and after laying the pipe on the grade line and connecting the pipe according to the approved plans and the manufacturer's requirements.

(b) The applicant, the applicant's representative, or the contracting officer shall make arrangements for the chief engineer, or a person designated by the chief engineer, to be present during the test.

(c) The applicant shall place a watertight plug in the downstream end of the pipe. The plug shall be sufficient to withstand a pressure of three pounds per square inch for the duration of the test. The plug shall be equipped with an acceptable means of draining the water out of the pipe after completion of the test.

(d) The applicant shall fill the pipe with water up to an elevation of 10 feet above the flow line at the pipe outlet, or up to the principal spillway inlet elevation, whichever is less, unless a different elevation is required by the test method described in K.A.R. 5-40-16(b).

(e) The applicant shall note the exact elevation of the water surface at the time the test begins. At the end of the prescribed test duration, the applicant shall measure the water surface elevation.

(f) The applicant shall use one of the test methods described in K.A.R. 5-40-16 to determine whether the water leakage rate is acceptable.

(g) If the leakage rate determined by either of the methods described in K.A.R. 5-40-16 is not acceptable, the applicant shall determine the source of the leakage and correct the leakage. After correction, the applicant shall perform another test in accordance with K.A.R. 5-40-15 and K.A.R. 5-40-16.

(h) If the leakage rate determined by either of the methods described in K.A.R. 5-40-16 is acceptable, the applicant shall drain and backfill the pipe in the manner prescribed by the approved plans and specifications. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303b; effective Sept. 22, 2000.)

K.A.R. 5-40-16. Testing a principal spillway pipe installation in a dam; allowable leakage rate, test methods. The allowable leakage rate for a principal spillway pipe installation in a dam shall not exceed 1,000 gallons per inch diameter of pipe per mile of pipe per day. The applicant shall use one of the following test methods in determining whether the allowable leakage rate has been exceeded:

(a) The applicant shall use the following test method procedure for a drop inlet structure if the starting and ending elevation of the water is within the vertical drop structure and above the top of the barrel:

(1) Calculate the allowable leakage rate in gallons per minute for the pipe being tested based on the following formula:

The allowable leakage rate in gallons per minute = 0.000132 x d x 1 where:

d = diameter of the tested pipe in inches

1 = length of the tested pipe in feet

If the allowable leakage rate in gallons per minute is determined to be less than one, then it shall be assumed for the purposes of the test that the allowable leakage rate in gallons per minute is one.

(2) Conduct the test for 15 minutes.

(3) If the allowable leakage rate is one gallon per minute, the applicant may use the following table to determine the allowable drop in the elevation of the water in the riser.

Nominal diameter of riser (inches)	**Allowable drop (feet)**
18	1.13
20	0.83
24	0.64
30	0.41
36	0.28

(4) If the measured drop in the riser exceeds the corresponding allowable drop in paragraph (a)(1) above, the allowable leakage rate has been exceeded, which shall not be acceptable. If the measured drop in the riser is less than or equal to the corresponding allowable drop in paragraph (a)(1) above, the allowable leakage rate has not been exceeded and shall be acceptable.

(b) The applicant shall use the following test method procedure for all other types of installations, including canopy inlets:

(1) If filling the pipe with water up to an elevation of 10 feet above the outlet puts water within the vertical riser below the top of the barrel, the elevation shall be reduced below the bottom of the vertical riser before the test begins.

(2) The allowable drop in elevation is a function of the allowable leakage rate, test duration, and the diameter and slope of the pipe. The allowable drop in the pipe in feet shall be calculated by use of the following formula:

$$\frac{\text{allowable rate (gallons per minute)} \times \text{test duration (minutes)} \times \text{slope (\%)}}{[\text{diameter (inches)}]^2 \times 4.08}$$

(3) The minimum test duration shall be 15 minutes. If the above formula results in an allowable drop of less than 0.1 foot in 15 minutes, the test duration shall be extended so that the allowable drop is greater than 0.1 feet.

(4) The water surface elevation drop shall be measured by means of a clear plastic tube installed in the plug at the downstream end of the principal spillway pipe. Any other means of measuring the drop in elevation shall be approved by the chief engineer in advance of the test.

(5) If the measured drop is greater than the allowable drop as calculated in paragraph (b)(2), the allowable leakage rate has been exceeded, which shall not be acceptable. If the allowable drop is less than or equal to the allowable drop as calculated in paragraph (b)(2), the allowable leakage rate has not been

exceeded, which shall be acceptable. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303b; effective Sept. 22, 2000.)

K.A.R. 5-41-1. Channel changes; plans and specifications. Plans for a channel change shall include the following: (a) A general location map or aerial photograph, showing the present alignment of the stream, location of the proposed channel change, section lines, property lines with names and addresses of adjoining landowners, drainage area, a north arrow, a bar scale, and any other prominent features;

(b) a detailed plan view of the project with stationing shown, including as many other views as necessary to fully describe the project;

(c) a profile drawing along the centerline of the proposed new channel. This profile shall extend five times the channel width upstream and an equivalent distance downstream from each end of the new channel. The stationing shown on the plan view shall correspond to stationing on the profile drawing. This drawing shall show the present ground surface, the present stream bed, and the grade line of the proposed new channel;

(d) cross sections of the existing stream at locations immediately above and below the proposed channel change. The location of these cross sections shall be described and shown on the plans. The elevations of the top of the existing banks and bottom of the channel shall be shown;

(e) at least one permanent bench mark conveniently located for use after construction, except for grassed waterways constructed for the purpose of conveying runoff without causing erosion or flooding. The location, description, and elevation of the permanent bench mark, to which all elevations are referred, shall be shown on the plans. The designer shall reference the project bench mark to the current national geodetic vertical datum, to a tolerance of plus or minus ½ foot on all channel changes involving perennial streams and where detailed floodplain data are available. Project datum shall be acceptable on all other channel changes; and

(f) a cross-sectional drawing of the proposed new channel, including dimensions. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1987; amended Sept. 22, 2000.)

5-41-2. Channel changes; water velocity. The new channel shall have a conveyance capacity equal to or greater than the old channel. The water velocity after the completion of the proposed channel change or stream obstruction shall not exceed a permissive velocity. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-41-3. Channel changes; side slopes. The side slopes of the proposed new channel shall not be steeper than one foot vertical to two feet horizontal unless the applicant submits data and analysis to show that a steeper slope will be stable. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-41-4. Channel changes; construction by erosion. New channels shall not be constructed by erosion. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-41-5. Channel changes; disposal of excavated material. (a) Material removed from the newly excavated channel shall be deposited at a location and in a form acceptable to the chief engineer. If the

material is to be deposited so that it will have the effect of a levee, a separate prior written approval of the chief engineer is required pursuant to K.S.A. 24-126.

(b) Filling or plugging the original channel shall receive the prior written approval of the chief engineer. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

K.A.R. 5-41-6. Channel changes; vegetative strips on new channels. On each new channel project, except a grassed waterway constructed for the purpose of conveying runoff without causing erosion or flooding, a vegetative strip shall be established and maintained for a width of 50 feet immediately adjoining the channel on each side of the stream if site conditions permit, or unless an acceptable engineering design shows that a greater or lesser width of vegetative strip is preferable. The general type of vegetation shall be approved by the chief engineer. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987; amended Sept. 22, 2000.)

5-42-1. Stream obstructions; plans and specifications. Plans for a stream obstruction shall include: (a) A general location map or aerial photograph showing the stream, location of the proposed obstruction, section lines, a bar scale, a north arrow, property lines with names and addresses of adjoining landowners, and any other landowners whose land may be hydraulically affected by the proposed stream obstruction, drainage area and any other prominent features;

(b) a detailed plan view fully describing the obstruction and the site;

(c) a profile showing the present elevation of the stream bed and both banks, extending upstream to the point where the stream bed elevation is equal to or higher than the top of the obstruction and extending downstream an equivalent distance from the project site;

(d) an elevation view showing the obstruction on a cross section of the stream and the valley up to the post project design flood elevation at the site;

(e) at least one permanent benchmark shall be conveniently located for use after construction. The location, description and elevation of the permanent benchmark, to which all elevations are referred, shall be shown on the plans. Reference to the national geodetic vertical datum of 1988, or other acceptable national vertical datum, to a tolerance of plus or minus one half foot is required for all stream obstructions on perennial streams and where detailed floodplain data are available. Project datum is acceptable on all other stream obstruction projects.

(f) details of the manner in which the obstruction is to be tied into the bed and banks of the streams;

(g) the land for which easements or rights-of-way are to be acquired if the proposed obstruction affects land other than that owned by the applicant; and

(h) unless it is clear that the impacts of the proposed project will be contained within the channel or limited to property under the control of the applicant, a hydraulic analysis determining the pre-project and post-project water surface elevations for the two-year flood and the 100-year flood shall be prepared and submitted to the chief engineer. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1987; amended T-5-12-30-91, Dec. 30, 1991; amended April 27, 1992.)

5-42-2. Stream obstruction; minor. If a proposed stream obstruction will not decrease the cross sectional area of a stream channel at the location of the obstruction by more than 15 percent, the plans required by the chief engineer shall be equivalent to the type submitted to the United States corps of engineers with applications for a department of the army permit. Such obstructions shall include weirs, causeways, low-water crossings, low-head dams, intake structures, boat launching ramps, pipeline crossings, outfall structures, marinas, boat docks, jetties and revetments. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

K.A.R. 5-42-3. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987; amended April 27, 1992; revoked Sept. 22, 2000.)

K.A.R. 5-42-4. Stream obstruction; temporary structure. A temporary structure shall not require a stream obstruction permit from the chief engineer pursuant to K.S.A. 82a-301 et seq. and amendments thereto if it meets all of the following criteria:

(a) The structure is temporary in nature.

(b) The structure is constructed only of temporary materials, including local streambed materials, straw or hay bales, plastic, or plywood, that are likely to wash out during a bank-full storm event.

(c) The structure is actively maintained only during the duration of the temporary beneficial use.

(d) The structure is less than two feet in height above the natural bed of the stream, and alterations to the stream and alterations to the stream bank are no more than are necessary for permitting access to the site for operation and maintenance.

(e) The structure is below the natural low bank of the stream.

(f) Any water backed up by the structure is detained solely on property under the control of the landowner that constructed the temporary structure.

(g) The structure does not materially adversely affect the public interest, public safety, or environment. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective Sept. 22, 2000.)

5-43-1. Sand dredging operation; plans and specifications. Plans for a sand dredging operation from a stream shall include: (a) A general location map or aerial photograph showing the stream, location of the proposed sand dredging operation, section lines, property lines with names and addresses of adjoining landowners, local access roads, a bar scale, a north arrow and any other prominent features;

(b) a plat of the area within which the sand plant will be operated, prepared to a scale of 200 feet per inch, or less, if necessary to show in detail the features of the stream at the location. The plat shall include at least one permanent bench mark. The survey shall also include at least two permanent horizontal control points on a baseline running generally parallel to the stream. These permanent points shall be identified with substantial markers and shall be easily visible in the field. The plat shall show the location of the natural banks on both sides of the stream, all islands, sand bars, and the direction of the stream within the channel. Where county commissioners have established bank lines along a stream in accordance with the provisions of K.S.A. 82a-307a, the location of such established bank lines shall be shown. The plat shall

also show the proposed location of the tipple, boundaries of areas from which material will be removed and the area to which rejected material will be returned;

(c) cross sections of the channel, measured along lines at right angles to the general direction of the stream and plotted to a horizontal scale of not more than 200 feet per inch and an appropriate vertical scale. Typical cross sections shall be shown for unobstructed portions of the channel as well as for portions in which islands, sand bars or other obstructions may be located. The elevation of the top of both banks, the bed of the stream, and the surface of islands and bars shall be shown on the cross sections. The location of lines along which cross sections are measured shall be referred to the baseline and indicated on the plat. All elevations shall be referred to a permanent bench mark, which is referenced to the national geodetic vertical datum of 1929 to a tolerance of plus or minus one half foot; and

(d) a statement of plan of operation. A brief paragraph shall be included explaining the plants usual operating plans. The kind of equipment, pumping capacities, seasonal limitations and any other operational constrictions shall be included. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1987.)

5-43-2. Sand dredging; buffer zone. There shall be a buffer zone of not less than 500 feet between dredging operations, and between dredging operations and all bridges. There shall be a buffer zone of 300 feet between dredging operations and buried pipeline or cable crossings. There shall be a buffer zone of 200 feet between dredging operations and levees, or other features subject to damage by undercutting. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-43-3. Sand dredging; operation. In counties at locations where bank lines have been established on designated streams pursuant to K.S.A. 82a-307, materials shall be removed only between established bank lines. The chief engineer, for good cause, may allow excavation or removal of material landward from established bank lines if approval is also obtained from the board of county commissioners. On navigable streams materials shall be removed only from the channel and in such a manner so as not to degrade the banks. On all other streams, materials shall be removed only from areas and in a manner approved by the chief engineer. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

5-43-4. Sand dredging; operations conflicting. If more than one operator proposes to operate within a given reach of a private stream, then all conflicting applicants shall be required to submit proof of easements or other legal authority to operate. If more than one operator proposes to operate within a given reach of a navigable stream, the chief engineer shall determine which operators shall be permitted, based on the following criteria: (a) The capability of the applicant's equipment to operate within the desired area;

(b) the applicant's need for the material;

(c) the applicant's existing operation, if any;

(d) the anticipated date the applicant will begin operation;

(e) the applicant's history of operation;

(f) the anticipated plant completion date;

(g) proof of the applicant's easements and right-of-ways necessary to operate;

(h) date of application; and

(i) any other relevant factor. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-302; effective May 1, 1987.)

5-43-5. Sand dredging; operation setback. Sand dredging operations located outside the channel of a stream shall be set back a minimum of 50 feet from the bank of the channel. There shall be a minimum slope on the sand plant side of not greater than one foot vertical to four feet horizontal. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective May 1, 1987.)

K.A.R. 5-46-1. General permits; bridge and culvert replacement projects. (a) Except as provided in subsection (e), the construction of any bridge or culvert replacement project with a watershed of 2,560 or more acres in zone one, 3,840 or more acres in zone two, and 5,120 or more acres in zone three shall meet the criteria in subsection (c) of this regulation. Before construction, the applicant shall apply for and obtain a general permit from the chief engineer. The application shall be filed on a form prescribed by the chief engineer and shall be accompanied by plans or sketches meeting the requirements of K.A.R. 5-42-2.

(b) Except as provided in subsection (e), the construction of any bridge or culvert replacement project with a watershed of fewer than 2,560 acres in zone one, 3,840 acres in zone two, and 5,120 acres in zone three shall meet the criteria in subsection (c) of this regulation. Before construction, the applicant shall properly complete an application for, and receive the consent of, the chief engineer. The application shall be filed on a form prescribed by the chief engineer.

(c) Each bridge replacement and culvert replacement project shall meet all of the following criteria:

(1) The project shall not be a change either in alignment or in the cross section of a stream of more than 200 feet in length on minor streams, and not more than 400 feet in length on moderate or major streams as measured along the original channel. A minor stream is defined as a stream or watercourse that has a mean annual flow of less than five cubic feet per second (cfs). The major streams are the Kansas River, the Arkansas River, and the Missouri River. A moderate stream is defined as a stream or watercourse with a mean annual flow equal to or greater than five cfs, but is not a major stream.

(2) The proposed culvert or bridge replacement shall have the following:

(A) A cross-sectional area at least equivalent to that of the original bridge or culvert for water to flow over, through or around; and

(B) a road grade across the floodplain and approaching the bridge or culvert that is not raised by more than an average of one foot. The average rise of the road grade shall be calculated by measuring the difference between the proposed grade and the existing grade at the beginning and end of each interval of 100 or fewer feet, dividing the sum of the two differences by two and multiplying the mean by the number of feet in the interval. The sum of these calculations from each interval shall then be added together and the total sum divided by the length, in feet, of the road alteration. The average road grade shall not increase by a cumulative amount of more than one foot since April 11, 1978.

(3) A vegetative strip measuring 50 feet from the bank and outward on each side of a channel change shall be maintained in a manner consistent with the existing riparian vegetation and other design criteria.

(4) The project shall not alter the channel's cross-sectional area by more than 15 percent, nor shall it alter the channel length by more than 10 percent.

(d) If any bridge or culvert replacement project does not meet the requirements of this regulation, the applicant may apply for a nongeneral permit pursuant to K.S.A. 82a-301 et seq., and amendment thereto, before construction.

(e) If any bridge or culvert replacement project does not meet the requirements of this regulation or the chief engineer determines that the project may have an unreasonable effect on the public interest, public safety, or environmental interests, the right to perform the following shall be reserved by the chief engineer:

(1) Require a general permit meeting the requirements of this regulation or a nongeneral permit meeting the requirements of K.S.A. 82a-301 et seq., and amendment thereto, before construction; and

(2) amend, modify, or revoke the prior general permit or consent issued in accordance with this regulation. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective Sept. 22, 2000.)

K.A.R. 5-46-3. General permits; sand and gravel removal operations. (a) Before the commencement or continuation of any sand or gravel removal from a site with a drainage area of 50 or more square miles above the site, the removal operation shall meet the criteria in subsection (c) of this regulation. Before the removal of any sand and gravel, the owner shall apply for and obtain a general permit from the chief engineer. The application shall be filed on a form prescribed by the chief engineer and shall be accompanied by plans meeting the requirements of K.A.R. 5-42-2.

(b) If the proposed sand or gravel removal operation meets the criteria set forth in subsection (c) of this regulation and there are fewer than 50 square miles of drainage area above the proposed sand or gravel removal site, a permit shall not be required unless the chief engineer determines that a permit is necessary to protect the public interest, public safety, or environmental interests.

(c) All sand and gravel operations covered by this regulation shall meet the following criteria:

(1) The sand and gravel removal operation shall be limited to removing a maximum of 100 cubic yards per year from each sand and gravel removal site. Other than bridge maintenance sites, all sand and gravel removal operations on the same stream and its tributaries shall be separated by at least 1,320 feet.

(2) A sand and gravel removal operation shall not be located within the following distances of a bridge, pipeline, cable crossing, levee, or other feature, except when the written permission or easement of the owner of the bridge, pipeline, cable crossing, levee, or other feature is obtained by the applicant, and a written waiver is granted by the chief engineer:

(A) 50 feet of the banks, or in the channels of the Missouri, Kansas, or Arkansas rivers, and 50 feet of the banks, or in the channels of their tributaries, for ½ mile upstream from the mouth of the tributaries;

(B) one mile of a public water supply intake;

(C) 500 feet of a bridge;

(D) 300 feet of a buried pipeline or cable crossing; and

(E) 200 feet of a levee or other feature subject to damage.

(3) Stockpiles of material shall be located in a manner that does not affect the flow of water on the property of any other landowner.

(d) If any sand or gravel removal operation covered by this regulation does not meet the requirements of this regulation, or if the chief engineer determines that the operation may have an unreasonable effect on the public interest, public safety, or environmental interests, the right to perform the following shall be reserved by the chief engineer:

(1) Require a nongeneral permit pursuant to K.S.A. 82a-301 et seq., and amendments thereto; and

(2) amend, modify, or revoke the general permit issued in accordance with this regulation. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective Sept. 22, 2000.)

K.A.R. 5-46-4. General permits; pipeline crossings. (a) Before the construction of any pipeline or buried cable crossing of a stream having 50 or more square miles of drainage area above the proposed project site, the project shall meet the requirements of subsection (c) of this regulation. Before construction, the owner shall apply for and obtain a general permit from the chief engineer. The application shall be filed on a form prescribed by the chief engineer.

(b) Any pipeline or buried cable crossings of streams that have fewer than 50 square miles of drainage area above the proposed project site and that meet the requirements of subsection (c) of this regulation shall not be required to have a permit pursuant to K.S.A. 82a-301 et seq., and amendments thereto.

(c) All pipeline or buried cable crossings covered by this regulation shall meet the following requirements:

(1) Underground pipelines and cables shall be buried at a depth below the stream bed sufficient to prevent exposure. For navigable streams, underground pipelines and cables shall be buried at a minimum depth of seven feet beneath the stream bed. For all other streams, underground pipelines and cables shall be buried at a minimum depth of five feet beneath the stream bed. Pipelines and cables shall be buried sufficiently into the banks to allow for a moderate amount of stream meander without exposure. The minimum depth may be waived if the owner or applicant demonstrates that the underground pipeline or cable is adequately protected against erosion.

(2) After installation, the channel and banks shall be restored to the natural elevations and configurations as nearly as possible. Armoring devices shall be installed when necessary to ensure bank stability. Surplus excavated material shall be disposed of in a manner that will not obstruct the channel or act as a levee.

(d) If any pipeline or buried cable crossing covered by this regulation does not meet the requirements of this regulation, or if the chief engineer determines that a pipeline or cable crossing may have an unreasonable effect on the public interest, public safety, or environmental interests, the right to perform the following shall be reserved by the chief engineer:

(1) Require a nongeneral permit pursuant to K.S.A. 82a-301 et seq., and amendments thereto; and

(2) amend, modify, or revoke the general permit issued in accordance with this regulation. (Authorized by K.S.A. 82a-303a; implementing K.S.A. 82a-303; effective Sept. 22, 2000.)